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ABSTRACT

Arguing that photo-interviewing yields richer data than that usually obtained from verbal interviewing procedures alone, it is proposed that this method of data collection be added to "standard" methodologies in instructional development research and evaluation. The process, as described in this paper, consists of using photographs of "episodes" in a project as visual cues both in interviewing subjects and in reports for stakeholders in the outcome of the project. It is noted that the technique can be particularly helpful for pilot-stage projects where innovation and development are organizational priorities. Some strengths of photo-interviewing are cited, and a nine-step strategy is proposed: (1) identify major questions and research or evaluation perspective; (2) prepare the data gathering approach; (3) photograph episode; (4) organize and label photographs; (5) prepare protocol; (6) pilot interview; (7) conduct and videotape interview; (8) analyze photographs, field notes, interview notes, and videotape; and (9) summarize findings. Discussions of the individual steps include examples from two attempts to incorporate photo-interviewing with inquiries involving separate program innovations, e.g., an intensive 40-hour hypermedia mini-course for higher education faculty and graduate students, and research, with high school juniors and seniors, which considered ways in which matrices could function as systematic organizing structures for concept and simple rule learning. Cognitive, ethical, and technical issues related to photo-interviewing are discussed, and an outline of implications drawn from these issues concludes the paper. A section of a photo-interview script that emphasizes critical incidents is appended. (31 references) (BBM)

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Using Photo-Interviewing as Tool for Research and Evaluation

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Introduction

The tradition in the area of instructional technology has been consistent in its approach to research and evaluation. The focus has been on documenting the success and failure of objectives. To a large extent, qualitative dimensions have been avoided. Unfortunately, in numerous research and evaluative efforts (especially those that are internally generated), objectives are not always clearly defined. Even those that are clearly defined in the proposal often suffer Murphy's law. Particularly when a program is in its first year of operation, reductionistic and objectives-based data collection strategies generate insufficient data for ongoing program improvement. Increasingly, instructional designers and educational psychologists are turning to innovative methods to collect and analyze data for interpretive research studies as well as naturalistic or improvement-oriented evaluations.

For these reasons, we propose that one other data collection methodology be added to the "standard fare". Photo-interviewing (Tucker & Dempsey, 1990) was selected as the strategy because it offers much promise in collecting holistic and consistent samples or records of critical phenomena. The viability of this method has been well documented in anthropology and sociology (e.g., Becker, 1978; Byers, 1964; Collier & Collier, 1986; Garfinkel, 1967) and has been further illuminated by Susan Sontag's (1977) cautions. Even so, photography as a method of inquiry has not been applied systematically in educational research or program evaluation (Fang, 1985; English, 1988). We need to know more about the rhetoric of words and pictures in educational inquiry. To unlock the meaning of this information, one must examine more than empirical facts. We need to grapple with the problem of gathering subjective and intersubjective perceptions. Central to our investigation is the study of what Erickson & Mohatt (1982) call "immediate environments of learning", namely an analysis of how instructional contexts are socially and psychologically constituted.

According to Collier & Collier (1986), "the production of photographs for purposes of research requires ...an overview of the culture or setting which allows all details to be seen within a context." This whole view of a context can be achieved in a variety of ways. This paper will focus on some of the techniques and challenges of using photographic evidence and photo-interviewing in educational evaluation and research contexts. For the purpose of this paper, we will differentiate the two terms on the basis of five dimensions: purposes, role of the client, methods, controls, and ends. *Research* aims for generalization, gathering descriptions, seeking conclusions and trying to explain causation. Directed by the researcher, research's methods often emphasizes the empirical, seeks internal and external validity as its controls, and the ultimate results may or may not have an immediate payoff. Contrast these characteristics with evaluation. *Evaluation* aims for satisfying specific situations and synthesizes judgments from a myriad of data sources in order

to facilitate decisions, rather than explaining causes. Directed by the client, evaluation's methods are multi-disciplinary, and uses utilitarian versus statistical controls (e.g., accuracy, utility, feasibility, and credibility). The ultimate results are expected to be immediate and practical.

Why Photo-Interviewing?

We believe that photo-interviewing yields richer data than that usually obtained from verbal interviewing procedures alone. Informants tend to examine images and react to cues present in those images more carefully than would have been expected using written or spoken cues alone. Photographs trigger recall and focus the interviewing process, enabling an in-depth look at intended as well as unintended aspects of a program. Photographic images solicit both differences and similarities in individual perception which can be validated and analyzed across groups of perceivers.

Photo-interviews can generate data particularly helpful for pilot-stage projects where innovation and development rather than status quo and maintenance are organizational priorities. Moreover, we posit that photo-interviewing can serve as an instructional as well as evaluative strategy given the projective nature of visual images. Photographs prompt reflection upon the program being evaluated which goes far beyond an interviewing situation lacking visual cues.

Photographic evidence of behavioral patterns can be "detected" in many ways. In a classroom environment, for example, visual data can include student body language, seating patterns, and off-task behavior. Photographs appear to act both as stimuli and verifiers of perception. By providing a common stimulus for informants, photographic images both solicit differences and similarities in individual perception which can be analyzed across groups of perceivers.

Moreover, a particularly potent argument for using photography (including film or video) is the potential for multiple applications in evaluation and research situations. Photographs capture direct observations of an environment and can serve as stimuli for interviews which in turn generate more data. In this sense, photography and its related media are particularly versatile in those environments in which methodological triangulation is applicable. This argument also raises the valid counterargument that using photographs as data and stimuli, for example, may lead to inconsistent or contradictory conclusions. This really is the argument against using any form of triangulation. Mathison (1988) asserts that it is unrealistic to expect that the use of multiple data sources, investigators, or methods can lead to a singular proposition about the phenomenon being studied. While his rationale may work from a behaviorist tradition, cognitivist models of reality seek holistic data collection, risking the price of inconsistent or even contradictory data in their quest for the wealth of information derived from multi-modality data sources. Admitting the inconsistencies and contradictions which must arise in using photo-related data sources is not

meant to justify an absence of some theoretical perspective. Rather, we contend that it is only through the use of robust cognitive theories that a researcher or evaluator has hopes of constructing plausible explanations of diverse phenomena.

Episodes: Applications in education and training

Our ideas concerning applications or "episodes" of photo-interviewing are based on two of our attempts to incorporate photo-interviewing with inquiries involving separate program innovations. Episode 1 involved an evaluation of an intensive 40-hour hypermedia mini-course for higher education faculty and graduate students. The setting of the episode was a computer lab. Episode 2, which is currently in the process of analysis, involved research with high school juniors and seniors and took place in a chemistry classroom. The study considered ways that matrices can function as systematic organizing structures for concept and simple rule learning. In the discussion of the photo-interviewing process which follows, we will use examples from both of these inquiries.

Photo-Interviewing: The Process

The function of all analysis is to find patterns. To identify patterns, photo-interviewing uses photographic tracking and selective responses to "peaks of information", when and where they happen. This is a flexible approach which can collect unpredictable as well as scheduled behaviors in research and evaluation contexts. As Hall (1974) advises, we approach the photographic content with an open strategy in order to respond to their holistic content. At present, the strategy we propose consists of a nine-step process.

1. Identify major questions and research or evaluation perspective.

The purpose of this stage is to clarify research or evaluation questions and approaches.

Example from Episode 1: An evaluation paradigm was negotiated by evaluators with stakeholders concerned with the hypermedia workshop. Consistent with initial discussions, this negotiation process delineated major questions, sources of evidence, and quality standards for the evaluation. Major questions were divided into those affecting the context, process, and product aspects of the evaluation.

Context questions dealt with four issues. Why was the class planned? How was the class planned in terms of: goals, objectives, and priorities, staffing, methodologies, prerequisites, and assessment? What characterized the setting in terms of unique or common factors as well as student and faculty backgrounds? Finally, what resources are available (e.g., hardware, software, text, readings, lecture notes, overheads, films, and guest lecturers)?

Process questions first considered how ongoing events evolved. What were student, faculty, and trainer perceptions over time? What was the planned versus real content? What were the barriers to success? Also an important process consideration centered on effectiveness. How

effective were various events which took place during the mini-course, (i.e., resources, processes,handouts, readings, cooperative learning events, cognitive versus behavioralistic teaching methods)? Which of Gagne's events of instruction were employed during particular periods? How receptive were the trainees at different junctures? What hindered and helped? What were the "light bulb events"?

Product questions began with how well the predetermined objectives were met. a related question considered which consequences (intended and unintended) were actually attained. We were also concerned student perceptions regarding the degree of match with early expectations. Other questions negotiated dealt with the transfer value of content and processes. Product-related questions in this particular evaluation were intended to focus especially on prerequisite skills, content, processes and sequencing.

Sources of evidence included photographs of the mini-course as well as participant comments from photo-interviewing sessions. Many other sources of evidence were collected as part of the negotiated paradigm. These include the course syllabus, context inventories, daily benchmarks, class size and attendee mortality, faculty vitae, student records, trainee demographics, evaluator notes, summative questionnaires, and HyperCard products produced by students.

Quality standards attempted to match context, process, and product evaluation questions. These were numerous, but included depth and breadth measurement; generating information that both documents and leads to program improvement; ensuring the transferability of content and processes; matching expectations with actual outcomes; communicating well-defined pre-requisites and accommodating diverse disciplines; the attaining both intended and unintended competencies; using the events of instruction effectively; efficient sequencing of the course; supplying adequate resources; integrating motivation throughout the course.

Comment: Visual anthropologists and visual sociologists recommend using a less structured approach toward inquiry when first examining natural phenonema. Program evaluation is much more focused in terms of major questions from the very beginning and this is reflected by our paradigm. Since photography is negotiated along with other sources of evidence and the aim is to lead toward program improvement, we designed our inquiry more deliberately than anthropologists or sociologists.

2. Prepare the data-gathering approach.

The purpose of this stage is to establish content parameters for the photographs (i.e., to isolate topics related to critical incidents). An additional task was to decide on the frequency and extent of coverage.

Example from Episode 2: After a good deal of contextual analysis, the researchers decided to concentrate on five topics related to the descriptive research. These topics were describing the

strategies used in learning, group work and partnering, feedback among participants, teacher contact, and reward-related occurrences. The photographer was free to take as many photographs as possible as long as he didn't feel he was being obtrusive. Based on prior experiences, such as Episode one, the researchers decided that photographs would be taken at the discretion of the photographer rather than at set (predetermined) intervals.

Comment: From one perspective, it is important that photographers functioning as data collectors are extremely open and receptive to the "unanticipated" in the environment in which they work. On the other hand it is also important that photographers have a perspective and purposely capture the "intended" in their inquiry. An excellent photojournalist, for example, may be assigned to cover a fire. The photographer knows she must "capture" critical events or incidents related to topics in newspaper or magazine readers' "fire" schemata. The topics are defined, yet the photographer is free to interpret in innumerable ways.

The following quote is attributed to John Szarkowski, the influential curator of the New York's Museum of Modern Art.

> Photography is a system of visual editing. At bottom, it is a matter of surrounding with a frame a portion of one's own cone of vision, while standing in the right place at the right time. Like chess, or writing, it is a matter of choosing from among given possibilities, but in the case of photography the number of possibilities is not finite but infinite. (Sontag, 1977, p. 192).

By establishing topics which later will be connected with critical incidents used in photo-interviewing, the photographer/data collector becomes both clear about the parameters of the episode and responsive to unanticipated phenomena.

3.Photograph episode.

The purpose of this stage is to gather visual data describing the environment.

Example from Episode 1: The mini-course was divided into two Friday-Saturday-Sunday segments. This was one of our first experiences with formative evaluation using photo-interviewing and we were following the pioneering work of Collier (1967). Thus, we opted during the first weekend to shoot at predetermined time intervals (every 20 minutes-- one close-up, one wide angle). After reviewing the effect of this strategy, we decided on a more participant-observer approach for the second three-day session which responded to critical incidents rather than time. Also, during the first three-day session, we used an electronic flash for illumination. During the second session, available light was used as a light source. When interviewed later, not one trainee (n=27) observed any differences between the first three-day session and the second. Further, most participants forgot about being photographed after the first 1/2 hour of the course.

Comment: In photographing program participants as part of an inquiry, one is reminded of Ziller's (1990) experiments with Self Theory in which subjects were given photographic equipment and instructed to photograph various abstract concepts. There is just no separating the photographer's self from the photographer's observations. The question is should a photographer intent on gathering the most useful data attempt to record "the decisive moment" as the work of Cartier-Bresson (1952) exemplifies or, alternately, map the environment as a type of social cartography. In responding to this question, first consider the nature of detection. Sometimes the camera, as a powerful instrument of description, should be called on to interpret diverse perspectives. On other occasions, the camera is needed only to record. Given our research in natural settings, we propose, photographers should consciously operate dualistically--both as an interpreter and as a recorder. It may even be argued that artificially imposing constraints such as shooting only at specified time intervals or using "standard" camera angles or lenses actually contributes to a most serious threat to validity: poor visual description.

4. Organize and label photographs.

The purpose of this stage is to organize photographic data in a fashion that will be most useful for photo-interviewing.

Example from Episode 2: Photographs (shot in black and white) were processed and 3 1/2 X 5 inch proofs were made of each negative. The proof prints were numbered sequentially by roll (e.g., B-31 would be the photo ID number for the 31st exposure on roll B). The classroom clock was included in the photographs every so often during the study to provide a temporal reference to accompany the chronological succession of images. The time for various shots could also be approximated by refering to the stationary video cameras of the classroom that were always running during the study.

After the photos were labeled, the researchers viewed the data as a whole. Photographs were screened individually and then, collectively. Data collectors and evaluators interviewed each other about perceptions invoked by the photographs in an effort to balance interpretative with recording shots. Questions and verbal comments of the researchers were noted and referenced to photo ID numbers.

After participants were scheduled for small group interviews (typically triads), photographs were clustered to include specific shots of individuals within a particular collaborative learning groups being studied as well as generic shots of the whole class. Finally, the photographs were organized to correspond to topics complementing the five research questions under study.

Comment: Whatever the strategy employed, photographs should be assembled in preliminary structured units which document a visual narrative. For example, photo events can be arranged as chronological experiences, as spatial maps of an environment, or as models.

In effect, the analysis begins here. This stage roughly conforms to the beginning of Collier & Collier's basic model for analysis (1986, p. 178). At the same time, the stimuli is arranged in a way that is intended to provide for efficient interviewing. It may be necessary, for example, to cull individual photographs which are clearly redundant. In our first attempts at photo-interviewing, we overwhelmed some interviewees by placing too many photographs on the table for their consideration. In trying to mentally sort the photographs into logical catagories for discussion, they became confused and often "got off-track" in their conversation. After that experience, it was clear to us that it is the researchers responsibility to limit the stimuli in a way that both helps subjects' recollections and allows some choice among the photographs selected.

5. Prepare protocol.

The purpose of this stage is to prepare a protocol (i.e., of verbal and visual questions) for the photo-interviewing session.

Example from Episode 2: These oral interview questions were organized around the evaluation paradigm's five major questions which concentrated on learning strategies, group work and partnering, feedback, teacher contact, and rewards. In this study, we generated a verbal interview schedule which explored each research question and then reorganized the question sequence using a loose adaptation of the critical incident technique.

The protocol or script was very specific in its wording so that the same questions were asked of all cooperative learning groups. After a brief statement in which subjects were informed that the researchers were asking the interview questions to see how well some methods of learning work, subjects were asked for general reactions to the five topics. The reader is referred to Appendix A for a delineation of the interview schedule.

The remainder of the protocol, with the exception of directions, were phrased in terms of critical incidents. A section of the interview script, concerned with learning strategies, is shown in Appendix B.

Comment: Flannagan (1954) defines critical incidents as specific reports of observed behavior from qualified sources. The critical incident technique is remarkable in that it provides open-ended responses which tend to avoid generalizations or opinions. This technique, which began as a military training invention, is used in job analysis for those tasks with a flexible or undefinable number of "right" ways to behave (Zemke & Kramlinger, 1985). In our judgment, this technique encourages participant sharing and the emergence of perceiver diversity without the typical oppression of the conforming group.

6. Pilot interview.

The purpose of this stage is to go through a "dry run" of the photo-interview.

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Example from Episode 2: In this study, as a result of last minute schedule changes at the school site, we were able to pilot the photo-interviewing session only with members of the research team and the class instructor. As such, we were primarily interested in what could go wrong with the photo-interviewing session. Were all photos numbered correctly? Was the video equiptment which would record the session properly checked-out? Could any questions in the interviewing script be made clearer? Was the interview text clearly associated with the research questions? Could the photo-interview be completed in the time we had available? Several items in the interview were revised and some photographs culled as a result of this process. This process also resulted in what we referred to as a "bring along checklist" which detailed the procedures, timelines, materials, and equiptment necessary for conducting multiple photo-interviews.

Comment: Piloting the photo-interview with individuals or small groups of the target population can minimize implementation problems. While we did not encounter major problems, Our efficiency could well have been improved by conducting one-to-one evaluations (Dick & Carey, 1990) with a sample of high school science students. Piloting with target members ensures that the interview questions, photographs, and procedures are age and ability appropriate. Converse and Presser (1986) recommend ten purposes for "pretesting" the instrument. The first four evaluate specific questions for variation, meaning, task difficulty, and respondent interest and attention. The last six bear on the instrument as a whole. These weigh the "flow" and naturalness of the sections; the order of the questions; skip patterns; timing; respondent interest and overall attention; and respondent well-being.

7. Conduct and videotape interview.

The purpose of this stage is to elicit and collect a flow of information regarding the research or evaluation questions.

Example from Episode 2: The photo-interviews closely followed the protocol or script discussed in step 5. After the interviewer reviewed the purpose of the study and made assurances of confidentiality, four groups of three subjects were interviewed. (There were several absences due to illness.) As this study considered two separate concept training strategies, two photo-interview sessions were held with each group. Interviews were scheduled a few days after each training session. Photographs discussed during this procedure were used to clarify and extend the data derived from the oral interviews.

In each interview, there was one interviewer. A videocamera with a remote microphone recorded the interviews for later analysis. A second photo-interviewer was also in the background, taking notes and occasionally asking probing questions.

Comment: During episode 2 we used critical incidents along with photographs. This is somewhat different than other researchers using photo-interviewing. Probably this approach is not

useful for all situations. Even so, there are three advantages in using questions aimed toward critical incidents. First, this approach encourages the perspective of "open- inquiry" which is particularly valuable in innovative development projects. The subject is encouraged to respond or project as they see fit. Second, questions phrased in this way get at facts as perceived by the subject-observer. They encourage description, not judgements. The description, however, is open to subject projections. Using photographs and anecdotes, the subject has the evidence to describe to the interviewer, what in his or her opinion "really happened". Finally, critical incident responses are focused on specific observable occurrences related to the research or evaluation. The critical incident technique works with the photographs to assure that subjects' responses spotlight scenarios related to reseacher or evaluation questions without cuing subjects to a particular viewpoint.

8. Analyze photographs, field notes, interview notes and videotape.

The purpose of this stage is to digest visual, auditory, and written records in ways that provide insight and information.

Example from Episode 1: Visual data (still and video) are supersaturated with information. This enormous quantity of information presents great opportunity and even greater difficulty in approaching analysis. In episode 1, we were faced with making sense of a particular class that was, after all, one small part of a continuing three year project involving very diverse sources of evidence. .

Collier and Collier's (1986) basic model for analysis was adapted for our particular needs. We began by organizing the data somewhat sequentially. We kept a fairly a narrative log of the visual chronology, spatial relationships of participants, and instructional content and processes during the course. We also had detailed records of the photo-interviewing process. These we gathered along with context and summative questionnaires, stills, and video to provide a context for our inventory. As much as possible, we organized our data into informal categories related to our research questions. Our approach at this point was what Collier and Collier refer to as "open viewing".

> Open viewing is an unstructured immersion in the visual record, a repeated viewing of all the material that allows you to respond to the images as they are and not simply as you expect them to be. (1986, p. 181).

To approach structured analysis, we returned to the paradigm negotiated at the beginning of the evaluative effort and especially to the major questions identified in the first step of this process. Context, process, and product questions provided a basis for organizing our perceptions. Although we did not reduce the questions to the level of microanalysis, we focused the data analysis by defining the evaluation questions and issues related to these questions.

Throughout both the open viewing stage and the focused analysis stage, notes were taken by the evaluators and much discussion ensued regarding findings. Collier and Collier (1986) have commented on the value of these exchanges between researchers.

"These discussions clarified details, raised important questions, and defined conclusions,and the interplay of ideas sharpened our examination of the evidence and the precision of our analysis. On a conceptual level these joint viewings were the most productive stages of the research. " (p. 177).

Comment: Finding an effective approach to analysis was (and is) the most difficult part of this process for us. Our approach did not include microanalysis. Our review of the literature uncovered three behavior patterns which constitute evidence for microanalysis: proxemics (measurements of space); kinesics (messages of body behavior); and choreometrics (patterns of behavior through time). Like many evaluators and researchers, we were struggling to control our basic techniques for descriptive analysis without concentrating on a purely "count, measure, and quantify" approach. We felt that quantifying visual information, while being easier to proceduralize, would tend to greatly lengthen the analytical process with no guarantee that the results would produce meaningful conclusions. On the other hand, we certainly do not disdain the use of quantitative microanalysis. We only agree with Collier and Collier (1986), that microanalysis is a reductionist, clinical technique useful in studying small components of human behavior. Particularly in the case of naturalistic evaluation, microanalysis is not compatible with the paradigm.

9. Summarize findings.

The purpose of this step is to make sense of the data analysis and offer conclusions to interested parties and stakeholders.

Example from Episode 1: Evaluation findings were used for internal and external purposes. Both uses entailed a two step editing procedure.

First, the findings were used as part of the internal evaluation of the course, the aim being to generate *program improvement* strategies. A written summary was submitted to project staff. This report was accompanied by annotated "generic yet contextually rich" photographs included in the body of the text to highlight major findings. Sensitive findings as well as "particular" photographs which could be traced back to a particular individual were shared verbally in a confidential setting but not put to paper. This first report attempted to validate findings and avoided the inclusion of judgments. Afterwards, we edited the initial findings, incorporated revisions generated by reactions to the first "draft" and added an implications and judgment section.

The findings were also used as part of the annual *documentation* to the funding agency which supported the development of the hypermedia course. Cleansed by the internal evaluation reporting process described in the paragraph above, a "final" annual summary was submitted to the funder. Using an executive summary format, it also incorporated generic photographs (though fewer than the internal evaluation report) in the text to highlight major findings.

Comment: Overall, it appears that the accuracy and the impact of any summary process depends upon the amount of time available for information feedback to the client, what kind of heuristics accompany the data, how the information is "framed", and the form of information display. At this juncture, photos seem to help match the client's initial certitude (and more hidden agendas) with resultant outcomes. In the case of project directors or funding agency program officers who cannot be on-site frequently, photographs helped mitigate the "jaundiced attitude" administrators have about typical evaluation reports. Rhetoric was backed up with visible evidence of process and product behaviors, a phenomenon very rare in education. Along with other program evidence, photos helped to triangulate the findings, including the presence of client's tunnel vision and blind spots (i.e., selective perception). Stakeholders tended to take the evidence "as is", demanded additional evidence less, and appeared to be more open to negative feedback and suggestions for improvement. One part of the explanation appears to be the relative ease in discerning the differential validity of photographs versus other information sources, especially after repeated exposure.

Evaluation experience indicates that this two tiered approach to data sharing is important for both cognitive and political reasons. The data is most likely to be heard and used by clients if they are satisfied with its truth value and utility value. This satisfaction index seems to rise when a client feedback about data accuracy is sought before presenting data of a judgmental nature. In terms of summarizing and reporting findings to the internal clients (current instructor, project director, and future trainers), we found that the use of photos along with narrative text, especially that which was backed up by quotes from participants, helped clarify the findings. It actually appeared to reduce the amount of feedback time required by the clients as well as enhanced the receptivity to results. This seemed to be especially true when the written and verbal feedback included photographs of the clients interacting with participants.

Issues Related to Photo-Interviewing

Our task as instructional researchers and evaluators concerned the issue of how to use photo-interviewing as a tool of inquiry that promoted a shared reality among stakeholders. We sought to use photographic evidence as a tool which made episodes overt among the significant players. Several additional issues should be considered in implementing photo-interviewing. These include cognitive, ethical, and technical issues.

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1.Cognitive Issues

The purpose of this section is to explore cognitive dilemmas of photo-interviewing. To seek meaningful patterns of human behavior, one must first start with human perceptions of reality. Specifically, three cognitively complex processes must be examined:

- the perceptual representation of exchanges (between information inputs and feedback messages) by interviewers and interviewees;
- the self-awareness of levels of perceptual representation; and
- the problem-solving skills of the interpreter regarding the data.

Perceptual Representation

Perceptions and judgments of photographs are a function of the interviewer's and interviewee's contexts. A variety of dilemmas assault our senses as we try to make meaning of our world. By making overt the vulnerable representations of both the photo-interviewer and those being interviewed, a synthetic picture of multiple viewpoints and values can be constructed. Through common stimuli (e.g., interviewer questions and photographs), these values can be articulated and help focus the study. In addition, these values can serve as judgment criteria for decision-making. On the other hand, if the operative values are not known, distortion results in terms of what is questioned, how evidence is gathered and how judgments are made. In other words, the value of a photograph varies greatly across viewers. One wonders if the repeated presentations of photographs to interviewees will confirm Sontag's (1977) speculation that repeated exposure to images anesthetizes one's representational capacity. What is the saturation point of the viewer to images? Without a doubt, each photograph has multiple meanings and the dual capacity to make reality manageable as well as opaque; continuous as well as discrete; simple as well as complex; and revealing as well as concealing.

Self Awareness

To come to grips with these operative values and multiple realities, individuals must become more self-aware of their subjectivities. Subjectivity has been defined in the dictionary as "the quality of an investigator that affects the results of observational investigation". If we accept Webster's definition, then it is fairly safe to assert that subjectivity operates throughout the entire photo-interviewing process. Subjectivity has the capacity to filter, skew, shape, block, transform, construe and misconstrue what transpires from the outset of a project to its final report (Peshkin, 1988). If subjective qualities permeate the investigation process at both conscious and unconscious levels, we must search for ways to control the potential bias by making these qualities more overt. One way to cope with subjective bias is to strive for enhanced validity through

multiple perceptions. One could conduct many individual photo-interview sessions and aggregate the data OR use group photo-interviewing to permit each perceiver to negotiate his or her subjective reality with others in a tangible and immediate manner. By viewing photos of critical incidents in a sequence with other participants, the learner and investigator alike can transcend the subjective biases resulting from individually dissociated and temporally "frozen" perceptions. The chances of distortion can be further decreased when the data collection method uses more than one sensory channel (such as auditory and visual channels involved with photointerviewing). Finally, the shared feedback of the photos appears to result in significantly better self-awareness than reduced feedback treatments (Harmon and Rohrbaugh, 1987).

Problem-Solving Skills

Photo-interviewing results are highly contingent upon the problem-solving and interpretative skills of the interviewer and interviewees. Photo-interpretation requires information search, and such search is guided by hypotheses which are suggested by semiotic cues. For interviewers and interviewees alike, the skill of generating hypotheses can range from novice to expert. Evidence in general problem-solving research suggests that problem-solving is primarily schema-driven for the expert and search-driven for the novice (Larkin, 1979; Sweller and Levine, 1982; Gilhooly, 1990). This finding has many implications for interpreting interviewee responses and evaluating the quality of interviewer questions. Expert interpreters should have a better memory for new information and a tendency to more clearly perceive the deep structure of the problem (i.e., the photograph to be interpreted). Neophyte viewers focus on key words in the question and surface structure features of the photograph.

In fact, the skills involved in photo-interviewing appear to be very similar to clinical problem-solving. Elstein, Schulman, and Sprafka's results (1978) suggest medical experts generate a few hypotheses within the first few minutes of contact with the patient based on presented symptoms and signs (reasoning forward). These hypotheses are then tested by deducing what other symptoms ought to be present and testing for them (reasoning backwards). Further, it is suggested that experienced physicians develop "illness scripts" containing prototypical information about real patients so that the problem-solving process becomes fairly automatic (Feltovich and Barrows, 1984; Hobus, Boshuizen and Schmidt, 1989). Since evaluation novices lack these real-life experiences, neophytes cannot proceed beyond superfical processing nor develop programmatic "scripts". We believe the photo-interviewing strategy assists in training novice researchers and evaluators to develop viable scripting skills. Photographs combined with verbal data can be overtly manipulated in a variety of contextual and sequential formats, helping them to perceive cues on many levels and reason both backwards and forwards.

2. Ethical Issues

The purpose of this section is to explore ethical dilemmas of photointerviewing. While the ethical implications of interviewing and observation have been studied for many years in biomedicine (Fang & Ellwein, 1990), visual anthropology (Collier & Collier, 1986) and visual sociology (Gold, 1989) , the polemical contexts of educational evaluation and research pose three unique questions.

- How to achieve an accurate representation of events from a research versus an evaluation perspective?
- How can informed consent be truly "informed"?
- How to increase evaluator/research vulnerability along with client/respondent vulnerability?

Accurate representation of events:

In the earlier section on cognitive issues, we discussed the impact of individual perceptions on event portrayal. In this section we will attempt to move from the psychology to the ethics of photo-interviewing. Achieving accurate portrayal requires the synthesis of interviewer and respondent perceptions. Given that researcher and evaluator perceptions are so context bound, accuracy demands that the contexts be representatively sampled in terms of time, purpose, activity/location, method, controls, and ends. Sampling over time and location is important because a program may change from the beginning to the end (Becker, 1978). The purpose of the photo-interviewing and specifically how its use is explained to participants can also impact the accuracy of results. Accuracy demands sampling both private and public (posed and candid) views of participants, which can be perceived as intrusive during the photographic act as well as risky for its ultimate reception when shared during the photo-interviewing session. The ethical risks are compounded when planned and unplanned activities must be captured; especially when it is perceived as "catching someone out". According to Cassell (1982), the "parity of the research relationship is based on the perceived power of the investigator and control of the setting...Persons must always be treated as ends in themselves, never merely as means." Evaluators have much less control of their respondents, which is more representative of a natural setting. Fang and Ellwein (1990) urge consideration of the costs and benefits to all participants in terms of financial, physical, intellectual, psychological and time factors.

Informed consent:

The quest for accuracy is tempered by the potential violation of confidentiality assured in the "informed consent form" signed by participants. Because of both the public and private nature of photographs, it is not possible to conceal the identify of participants nor the setting (Gold,

1989). But while the participant may be knowledgable about the initial concept of the study and initially agreeable, the program changes over time, activities, competence, and trust-building capacity of the photo-interviewers. Gold emphasizes that this issue is compounded by the phenomenon that: a) photo-interviewers and informants are likely to hold different meanings to a picture; and b) photos can be easily gathered without participant awareness. The affect triggered by a picture can vary "profoundly and unpredictably" during the photography as well as after the photos have been developed. Cassell and Wax (1980) advocate substituting the one-shot consent form into a negotiated "covenant" between the observed and the observers. This relates to Gold's coventantal relationship whereby the evaluator and informant develop consensus about the framing of the photograph, the final print, its use and its interpretation. By asking participants to explain their interpretations singly and in small groups, insights can be confirmed about the program's integral contexts, processes, and products. The high degree of interdependence required to cope with this ethical dilemma is much easier to achieve with an evaluation paradigm than an research paradigm which posits little or no control by the subjects. And even then, the evaluator must be very sensitive to each informant's culture and individual reactions. Accurate portrayal requires an evaluator who is not only sensitive and capable of generating meaningful exchanges, he/she must be able to read the participants "visual code" over multiple photos and different levels of visibility (e.g., overt, opaque, covert).

Vulnerability

Who controls the nine phases of photo-interviewing? Where can negotiation play a role? How can the openness of both the observed and the observer be assured? Should a narrative accompany each photograph? And when can vulnerability become a positive condition rather than something to be avoided at all costs? These questions all have vulnerability and control issues in common. Our field studies have shown that the risks of non-negotiation with clients and informants is far greater than the reverse condition. Photo-interviewers who share with informants the selection of critical photographs (candid and public) as well as their use in subsequent reports and presentations lower the chances of misrepresentation, oppression, and harm. Verbal or written narrative which accompanies a photograph further minimizes a photograph being taken out of context. Becker (1986) goes on to add the caveat that both photos and corresponding text should be approved prior to publication or dissemination. Our experiences led us to develop another method for reducing photo-interviewer distortion and oppression--using two photographers to capture an event, using the photo-interviewers and sampling of the target group to select photographs for inclusion in the interview, and interviewing in teams.

3. Technical Considerations.

The purpose of this section is to consider:

- recent developments in photographic technology which may affect photographic data collection and interviewing;
- employing still versus motion stimuli for photo-interviewing.

Recent Developments.

Among the most invigorating aspects of using photo-technologies for data collection and photo-interviewing are the enormous changes going on with the technical capabilities of related media. The dust has not settled on the answers to ways photography will customarily be viewed in the near future. Even so, the handwriting is on the wall for traditional continuous tone images printed on photo-sensitive substrates. This is not an argument for technology for its own sake. Simply, we make comments here because changes are occuring with the processes with which we work. These technology-driven changes, and the long-term reduction in cost per image which will likely accompany them, will encourage greater use of visual media for evaluation and research purposes.

One of the most important recent developments in this regard is the September 1990 announcement by Eastman Kodak of *Photo CD*, a format to be available next year that allows the average home photographer to take up to 100 photos on a special compact disc and inserts into a combination audio CD/Photo CD player and can then be viewed on a television set.

Another rather recent development is the somewhat recent proliferation of "frame grabbing" programs which pull stills or short video segments off of videotape or videodisc. Made possible by innovations such as IBM's M-Motion Video card, stills or video may easily be incorporated into custom software hypermedia programs such as Toolbox on the IBM or Supercard on the Macintosh. The potential for scanning imagery for software programs has been commonplace for some time, but these developments greatly simplify the processes associated with capturing and inserting researcher or evaluator-generated visuals. Other factors which will push the use of photo-related technology are the familiarity with visuals of the "TV generation", the now everyday use of computer technology by all but the most resistant, and the greatly reduced cost of the large amount of computer memory necessary to include graphics in software programs.

It is reasonable to expect that research and evaluation models and methods will adapt to the unprecedented potential accompanying these technological innovations. Microethnographers are already using sophisticated textual analyses to examine speech events recorded in situ and transcribed (Levine, 1990) . Likewise, qualitative researchers and evaluators in education and related social sciences increasingly will use the photo-related data collection and the computer to gain insight into the structure of learning and learning behavior.

Still versus motion

As we have mentioned, it is our preference to gather images for photo-interviewing sessions using a still camera. There are three reasons for this approach. First, a still camera is small, highly-mobile, and forces the data collector to concentrate on "collecting" a single, most valuable image at a time. A data collector is forced by the medium to look for the visual epitome of an occurrence. Second, photographing snippets of information with stills instead of great buckets of data with video frees the evaluator or researcher to work with a more manageable amount of information. Paring down hours of video for use as stimuli in a photo-interviewing session in which even more video will be shot becomes an overpowering, time-consuming task. Third, laying out several photographs on a table or pinning images to a wall during a photo-interviewing session is a relatively natural way to observe diverse imagery. It is fluently understandable to subjects in the way that a still montage is. Subjects invariably home into a single photograph or details of a single photograph. It is the same phenomena that is used to identify a suspect in a crime or increase the power of a microscope to make details clearer. Humans naturally want to dissect information in a visual image. Those who recall David Hemmings' obsession for making the strange familiar in Antonioni' s "Blow up" can imagine the disorientation that might be present in attempting to really dissect a moving image. Few of us not reared on Nintendo games would be capable of it. Perhaps most of us can only truly concentrate on that which is not changing. In effect, we become disoriented by the impossibility of totally concentrating on what is changing.

Conversely, in some cases where time, motion, and sound are important, film or video is irreplacable. Video and film, properly employed can capture a choreography of interpersonal relations in a way that stills usually can not. Artfully shot footage is wonderful for recording the tempo of an event. In essence, the arguments against using moving imagery for photo-interviewing mean little when motion and sound are needed for some reason.

Conclusions and Practical Implications

Several preliminary implications, drawn from issues discussed in this paper, are communicated below.

Given the aims of educational evaluation and research vary from that of the pioneers in photo-interviewing (i.e., biomedicine, sociology and anthropology), the original procedure delineated by Collier needed some modification. The nine step process presented in this paper seems to address the needs of instructional technology more directly.

Photographs can be used as more than data sources. They can also be used for grounding contexts and illustrating concepts across groups of informants and potential "inductees". For evaluators and researchers, the photo-interviewing process creates a common and concrete reference point for subsequent comments and analysis. Wider use of this methodology will certainly be enabled by recent technical developments in photography as well as computer

manipulation of qualitative data. One application currently being explored by the authors involves blending photo-interviewing with interactive-video disk technology.

Photo-interviews yielded "richer data" than that obtained from verbal interviewing procedures. One reason is that informants tended to examine images more carefully than the written or spoken word. Further, it appears photo-interviews can generate data particularly helpful for pilot-stage projects where innovation and development rather than maintenance are the priorities.

Photographs can dissolve the alienating or closed verbal authority of the evaluator and researcher, likened to the effect of lecture loving professors who in the process of talking "squelch" or reject interpretations of students who perceive events differently. By providing a common stimulus for all informants, images both solicit significant differences and similarities in individual perception which can be statistically analyzed across groups of perceivers. The methodology provided a means of "getting inside" the program and its context to describe and explain the program and its consequences in terms of participants' realities and meaning systems that oral interviewing did not permit.

To apply this methodology accurately, three cognitively complex processes must be examined: the perceptual representation of exchanges between photo-interviewers and respondents; assessing and enhancing the self-awareness levels of perceptual representation; and systematically building the problem-solving skills of the interpreter regarding potentially overwhelming data.

Photo-interviewing can serve as a research as well as an evaluative strategy given its projective nature. Photographs seem to have a life of their own beyond the evaluation or the project. For example, those photographs which generated negative perceptions (e.g., viewed as inaccurate, disturbing or infuriating by informants) were often indicative of rejection of overt data at odds with their own internal data or belief structures.

Photo-interviewing does not work in all instances. The different contexts of research and evaluation distinctly effect its viability as illustrated by our two episodes. And ethical questions need to be repeatedly raised in terms of: how accurate portrayal of events is achieved; how to make "informed consent" of participants "informed"; and how to reduce exploitation by increasing the interpersonal vulnerability of the observed and observers.

Lastly, enormous technological innovations, including radically different photo materials and hardware, are occuring. Technology-driven changes, the long-term reduction in cost per image, and improved methods of analysis will encourage greater use of visual media for evaluation and research purposes.

In conclusion, although it is unusual to end a paer with a quote, we feltthe following statement by with John Collier was particularly germane.

I recommend a process of photographic tracking and selective response to 'peaks of information' where and when they happen. This is a flexible approach, one that can be responsive to unpredictable and uncontrollable behavior in social and cultural field settings. It is a process in which selectivity is not an immaculate and mechanical exercise, but a manifestation of human sensitivity, one that rightfully portrays significant research as an accomplishment of human judgement. (Collier, 1979, p. 163).

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Appendix A: Section of a photo-interview script which emphasizes critical incidents.

In the next set of questions we are going to lay some pictures of your group working on the table. These photos are numbered. Take a minute to look at them.

If any of them remind you of something or are useful to you in making a point, use them in any way you want. I'll read off the number when you talk about the photograph so that we can tell which photo you were talking about later when we look at the video tapes.

1. Strategy

1P1: Look at these photographs. Do any of these photographs remind you of when you were having trouble with or else when you starting to feel comfortable [using the concentration game or coming up with examples] ? (Pause)

(1a) Think of the time that you got stumped [using the concentration game or coming up with examples]. (Pause) When did this incident happen? What happened?

(1b) What happened to help you figure out how to use this [using the concentration game or coming up with examples]? Or did you use another method? (Pause)

(1c) Think of the time this [using the concentration game or coming up with examples] was the easiest for you to use. (Pause) When did this happen? (Pause)

(1d) Think of the time you felt comfortable in using this [using the concentration game or coming up with examples]. (Pause) When did you see the forest through the trees? What happened? (Pause)

(1e) Think about some strategies you might normally use in learning material of this type? (Pause) Tell me about some occasions when you used your own strategies to learn science material. (Pause)

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